

Supplemental Data – Table and Figure Legends

Table S1. Related to RNA-seq method section. ummary - ATXN1 mouse cerebellar RNA-seq.

Table S2. Related to Figures 1 and 3. Magenta module gene list.

Table S3. Related to Figures 1 and 3. Lt Yellow module gene list..

Table S4. Related to Figure 2. Magenta module hub gene connectivity.

Table S5. Related to Figure 1. Ingenuity pathway analysis (IPA) of ataxia-associated ATXN1 cerebellar WGCNA modules.

Table S6. Related to Table 2. Magenta genes with Cic binding motifs in their upstream region.

Figure S1. Related to Figure 1. Overview of cerebellar gene expression changes in ATXN1 transgenic mice. (A) Differentially expressed genes in cerebellar RNA from ATXN1[82Q] ATXN1[30Q/D776 mice at 5, 12 , and 28 weeks. (B) Differentially expressed genes in cerebellar RNA between 5-12, and 12-28 weeks within each genotype; ATXN1[82Q], ATXN1[30Q/D776, and wt (FVB/NJ).

Figure S2. Related to Table 1. Magenta module genes ISH summary. Magenta Module genes are listed according to their ISH expression pattern as found on the Allen Brain Atlas (<http://www.brain-map.org/>). Sample ISH expression images for Pc-exclusive strong, PC-exclusive weak, PC-enriched, and multiple cell types are presented with the list of Magenta genes with each expression pattern listed below.

Figure S3. Related to Table1. Lt Yellow module genes ISH summary. Lt Yellow Module genes are listed according to their ISH expression pattern as found on the Allen Brain Atlas (<http://www.brain-map.org/>). Sample ISH expression images for Pc-exclusive strong, PC-exclusive, weak, PC-enriched, and multiple cell types are presented with the list of Magenta genes with each expression pattern listed below.

Figure S4. Related to Figure 2. qPCR analysis of a subset of Magenta Module genes in 12 week old *Atxn1^{2Q/154Q}* cerebella.

Figure S5. Related to Figure 5. *Cck*^{-/-} mice have altered cerebellar phenotypes but lack progressive cerebellar pathology. A) Representative images depicting primary cerebellar fissure showing Purkinje cell morphology revealed by calbindin immunostaining. Scale bar, 200 μ M applies to all images in this panel. (B) Purkinje cell counts for per 250 μ M at 20 weeks and 1 year of age in wt and *Cck*^{-/-} mice. (C) Changes in cerebellar molecular layer thickness at 20 weeks and 1 year of age in wt and *Cck*^{-/-} mice. Data are represented as mean, \pm SEM. Two-Way ANOVA, Tukey post-hoc test. *p<0.05. (D) qRT-PCR analysis of *calbindin* (*Calb*) mRNA levels in 1 year old in wt and *Cck*^{-/-} mice. Data are represented as mean, \pm SEM. Student's t-test. *p<0.05.

Figure S6. Related to Figure 6. Cerebellar *Cck* and *CcRr* Expression. The representative ISH expression patterns for *Cck*, *Cck1r*, and *Cck2r* from the Allen Brain Atlas (<http://www.brain-map.org/>) are presented.

Table S1. Related to RNA-seq method section. ATXN1 mouse cerebellar RNA-seq summary.

Genotype	Disease Status	5 weeks	12 weeks	28 weeks
wt/FVB	unaffected	197** (8.1,8.6,8.0)	44.5* 9.2,9.1,9.3	40.3* 9.2,9.1,9.2
RINs (RQS)				
<i>ATXN1[30Q]</i>	very mild	188** (8.1,8.1,8.1)	ND	ND
RQS				
<i>ATXN1[82Q]</i>	severe ataxia, progressive degeneration	190** (8.3,7.9,8.4)	61.1* 9.0,9.1,9.2	27.5* 8.9,8.9,9.0
RINs (RQS)				
<i>ATXN1[30Q]D776</i>	severe ataxia, non-progressive degeneration	203** (7.9,7.9,8.0)	51.8* 9.4,9.2,9.2	30.5* 9.0,9.0,9.0
RINs (RQS)				

* - Sequences obtained using Illumina GAIIX

**- Sequences obtained using Illumina HiSeq 2000

Table S3. Related to Figures 1 and 3. Lt Yellow WGCNA module gene list. Values that were not significantly differentially expressed are omitted. Note: these differential expression values were calculated within each week, so values can be compared within a batch, but not between.

Table S4: Related to Figure 2. Magenta Module Hub Gene Connectivity

Gene	Intramodular Connectivity
Fam21 – Family sequence homology 21	50.512
Stac – SH3 and cysteine rich domain	48.269
Innpp5a – Inositol polyphosphate-5-phosphatase A	47.498
Trpc3 – Transient receptor potential cation channel, subfamily C, member 3	46.365
Fam107b – Family sequence homology 21, member B	45.270
Dner – Delta/notch-like EGF repeat containing	44.834
Grik1 – Glutamate receptor, ionotropic, kainate 1	44.595
Gabbr1 – GABA B receptor, 1	44.536
Rgs8 – Regulator of G-protein signaling 8	44.355
Homer3 – Homer homolog 3	43.294

Table S5. Related to Figure 1. Ingenuity Pathway Analysis (IPA) Disease-Associated ATXN1 Cerebellar WGCNA Modules

WGCNA Module	Top Upstream Regulators	p-Value	Top Canonical Pathways	p-value
Magenta	Atxn1	5.91e-08	Synaptic LTD	1.49e-5
	Erbb2	3.97e-06	GluR Signaling	2.7e-04
	Tgfb1	5.21e-08	Dopamine-Darpp32 cAMP Signaling	1.05e-03
	Bdnf	1.82e-06	Hippo Signaling Bladder Cancer	2.39e-03 2.53e-03
Lt Yellow	JunD	1.12e-04	Planar Cell Polarity Signaling	1.45e-04
	Tert butyl hydroperoxide	1.81e-04		

Table S6.1. Related to Table 2. Cic binding motif - TGAATGGA

4930413G21Rik	Fam222a	Nek2	Rhobtb2
5730422E09Rik	Fgd3	Nell1	Rian
9530062K07Rik	Fgf11	Nexn	Rps6kc1
Adamts3	G630025P09Rik	Nkd1	Rpusd3
Aldh9a1	Gas8	Nlgn2	Scn1b
Aldoc	Gjb2	Nr2f2	Sema7a
Ankrnd33b	Gla	Nsg1	Sfxn1
Ano6	Gm3230	Ntnng1	Sh3pxd
Antxr1	Golt1b	Ntnng2	Shisa6
Arap1	Hk2	Opn3	Slc35c1
Arhgef33	Hnrnph2	Otud1	Slc41a3
B330016D10Rik	Homer3	Padi2	Slc9a3
B3gnt2	Hpcna	Papss2	Snx9
Cacna1g	Id2	Pcdhgb5	Spag5
Cacng4	Imp4	Pcsk6	Spns2
Calb1	Inca1	Pde5a	Sppl2b
Ccdc115	Inpp4a	Pex26	Strip2
Ccdc120	Itpka	Phactr3	Sulf1
Ccnd1	Jun	Pkp3	Synj2
Cd70	Kalrn	Plxdc1	Tmem256
Cep104	Kcna6	Polr1d	Tmem41a
Cep72	Kcnab1	Ppapdc2	Tmod1
Cerk	Kcng4	Ppm1j	Tmtc1
Chst8	Kcnip1	Ppp4r4	Trabd2b
Cmtm3	Kctd12	Prkcg	Trmt61a
Colq	Kif1c	Prmt8	Trp53bp2
Cox6b2	Kif5a	Prpf3	Trpc3
Cpeb1	Lnx2	Ptprm	Tspan11
Cthrc1	Lpcat1	Rab43	Tuba8
Cttnbp2	Lsm7	Rabl6	Ubash3b
Enpp4	Mapk4	Rasal1	Uspl1
Ephb2	Medag	Rbbp6	Vimp
Etv4	Mfsd12	Rdh11	Vwa7
Fam117a	Mir5130	Recql	Wiz
Fam174b	Mthfd1l	Reep2	Zbtb40
Fam19a3	Mylip	Rell1	
Fam21	Nadsyn1	Rgs8	

Table S6.2. Related to Table 2. Cic binding motif - TGAATGGA

6030419C18Rik	Far2	Mtss1	Tnc
A930001C03Rik	Fbxl22	Mxi1	Tob1
Ablim2	Fgf11	Mxra7	Trim9
Aif1	G630025P09Rik	Mylip	Tspan11
Aldh9a1	Galnt4	Nadsyn1	Wsb2
Antxr1	Gfap	Neurod2	Zdhhc14
Atf1	Gjb2	Nup93	Zdhhc16
Atg2b	Gla	Ociad2	Zfp512
Atl2	Gm9866	Opn3	
B330016D10Rik	Gsg1I	Padi2	
Cacng4	Gskip	Pcdhgb5	
Calb1	H2-D1	Pde5a	
Casp3	H2-L	Poc1b	
Ccdc115	Heatr5a	Polr3k	
Ccnd1	Hnrnph2	Pou3f4	
Cd70	Hrh3	Ppp4r4	
Cdk16	Hrk	Primpol	
Cemip	Igfbp5	Rbm19	
Cep104	Ittifb	Rhod	
Clmn	Imp4	Rnf157	
Cmtm3	Inpp4a	Rnf19b	
Cox6b2	Inpp5a	Sema7a	
Cpsf3	Ipo5	Sh3glb2	
Creg1	Itgb1bp1	Sh3pxd2b	
Ctnbp2	ItpkA	Slc1a6	
Dap	Kalrn	Soat1	
Deaf1	Kcnab1	St6gal1	
Dffb	Kcnip1	Stac	
Dhcr7	Kcnmb4	Stap2	
Eps8l2	Lancl1	Stk17b	
Etv4	Lhpp	Strip2	
Exosc1	Lix1	Sulf1	
Fam107b	Medag	Syt13	
Fam117a	Mex3b	Tbpl1	
Fam174b	Mpnd	Tmtc1	

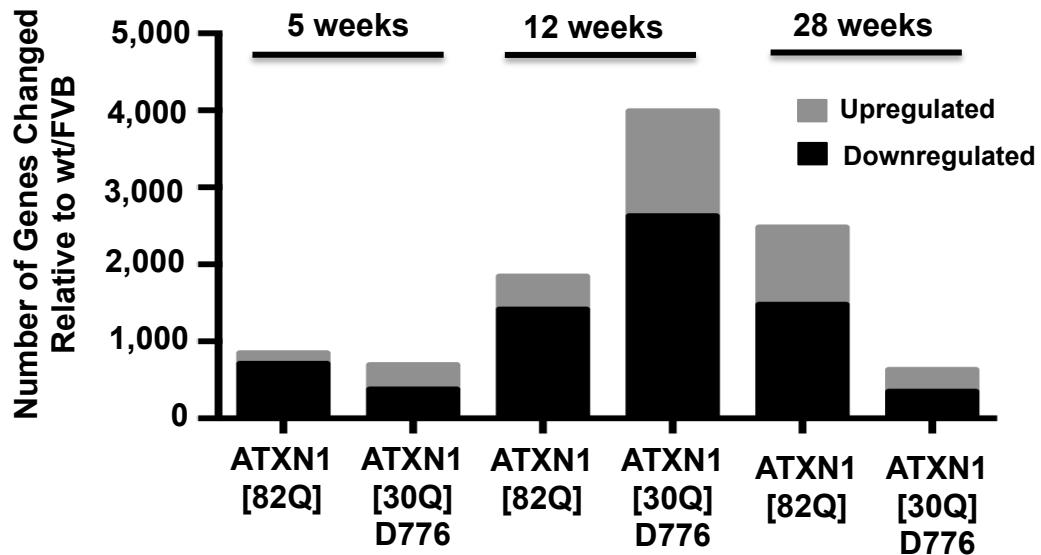
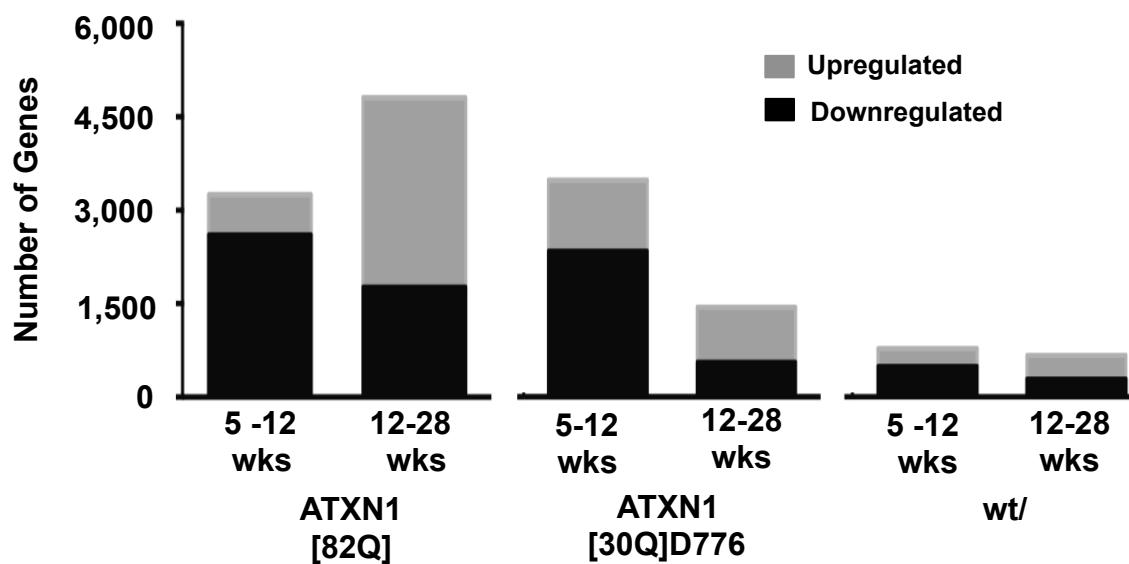
A**B**

Figure S1. Related to Figure 1.

Magenta Module

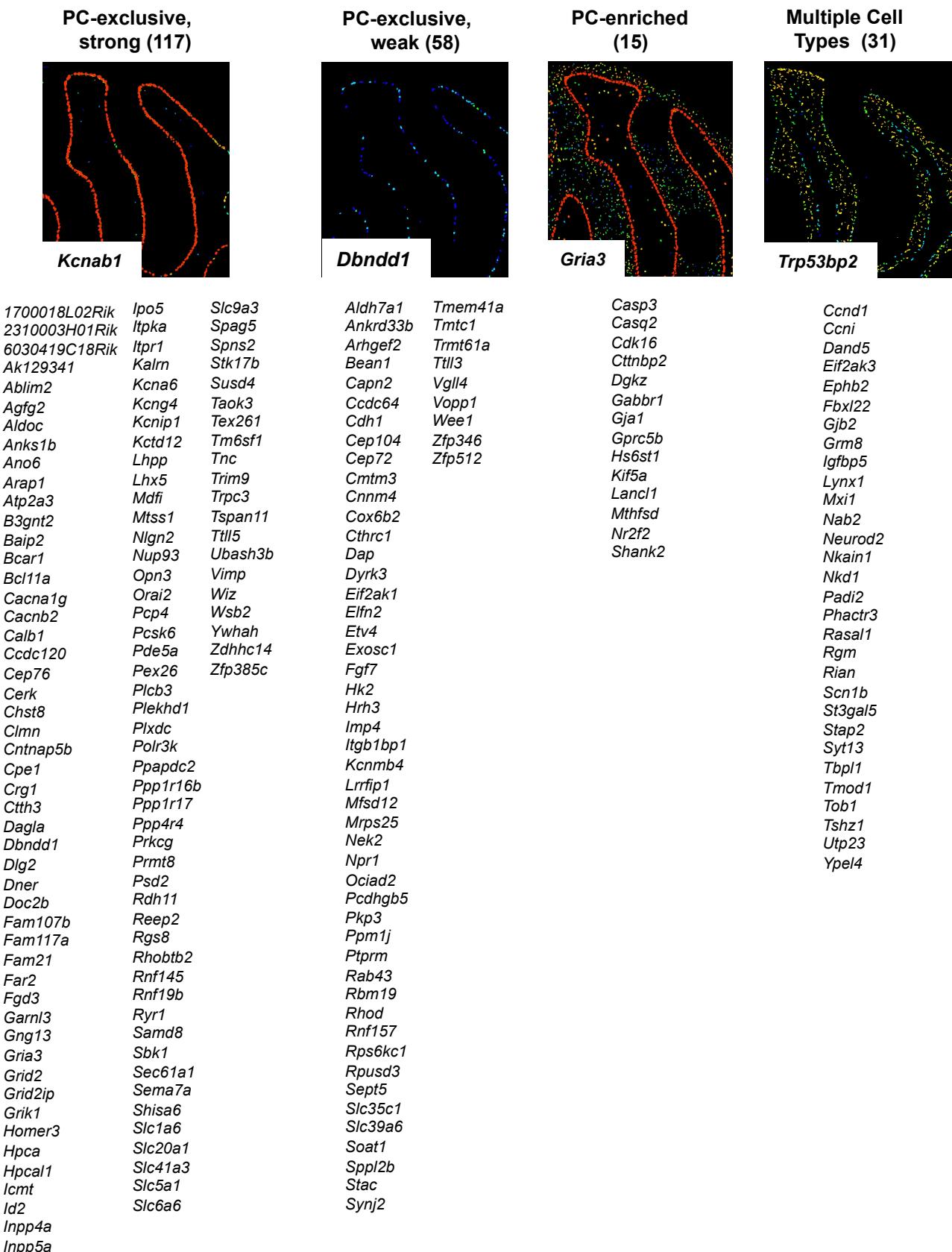


Figure S2, Related to Table 1.

Lt Yellow Module

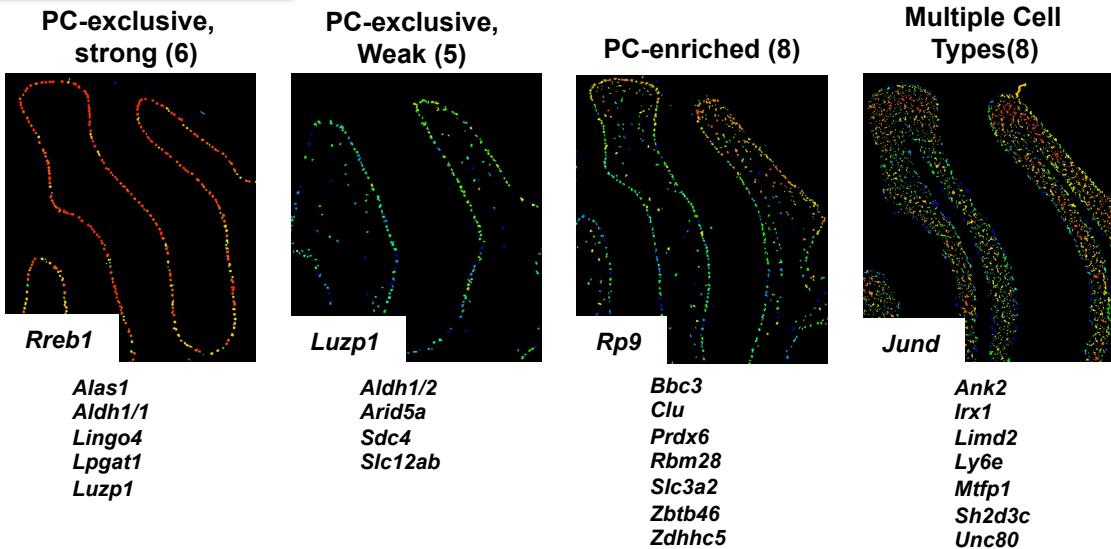


Figure S3. Related to Table1

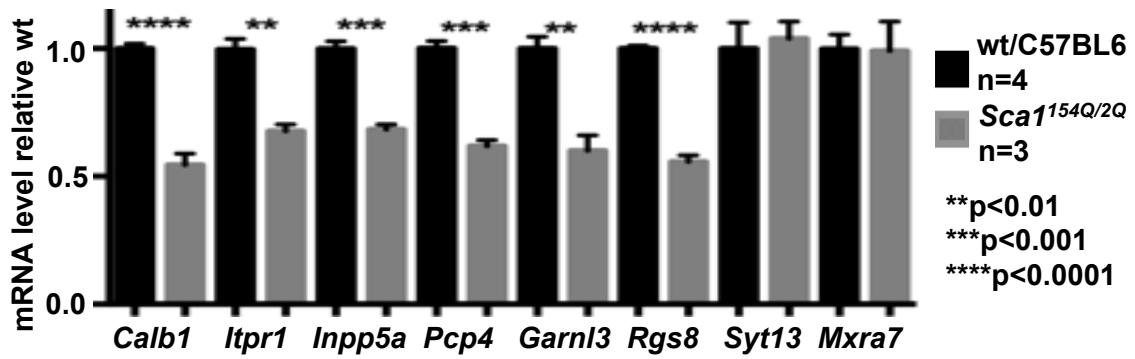


Figure S4, Related to Figure 2.

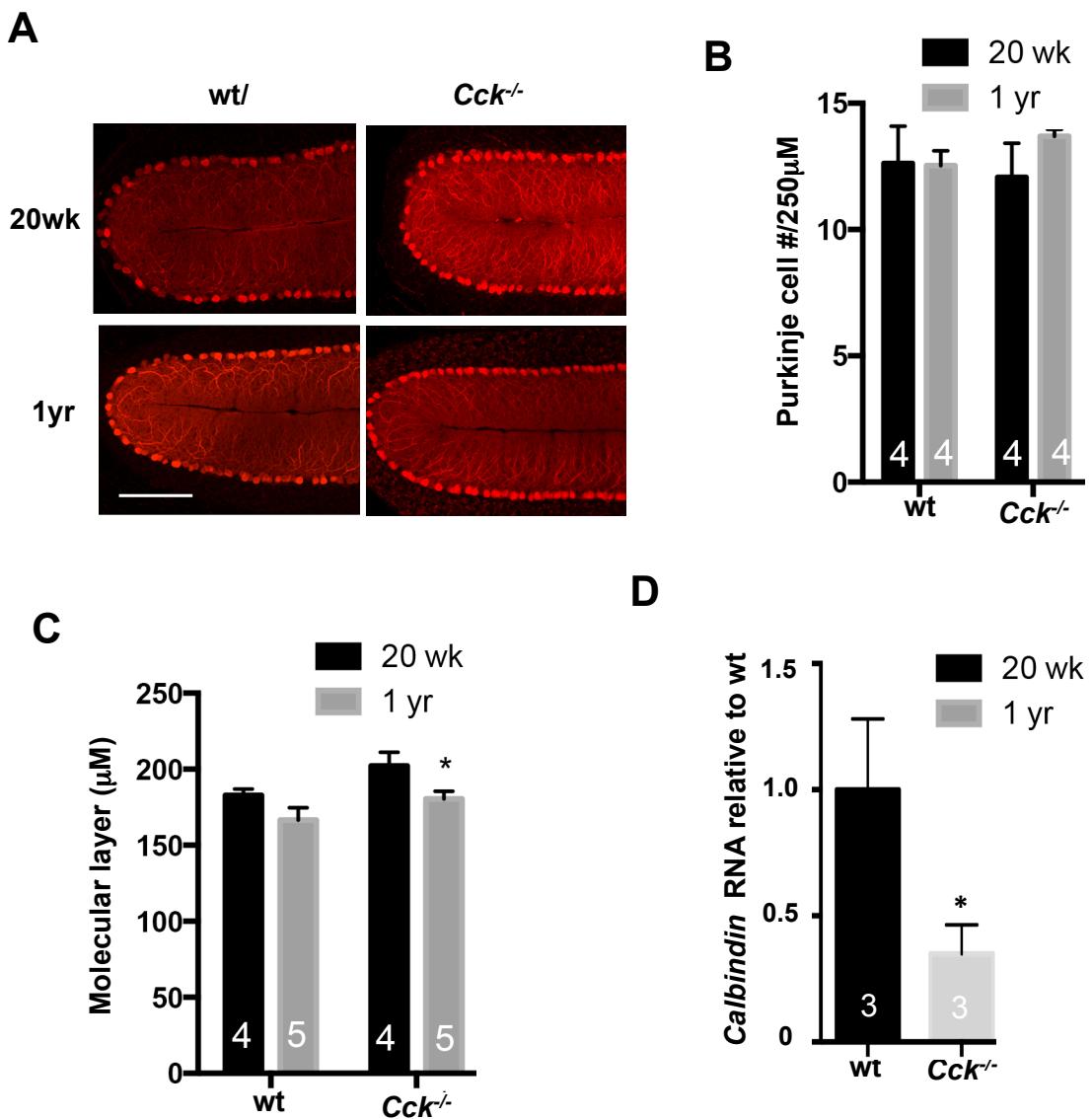
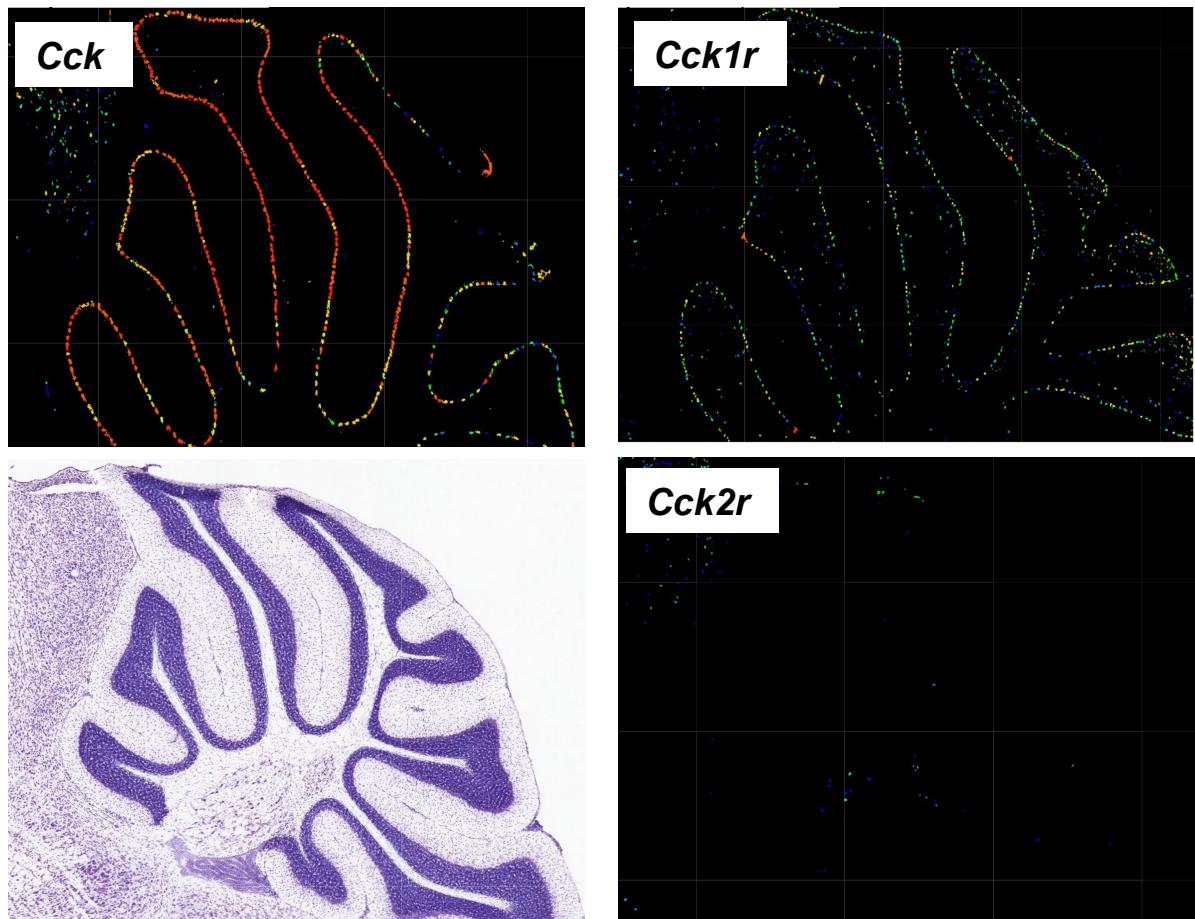


Figure S5. Related to Figure 5.



Allen Brain Atlas

Figure S6. Related to Figure 6.